# The DL1YMK Portable Moonbounce Approach

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The presentation on the EME-conference 2006 in Würzburg gives an overview of our moonbounce DXpeditions to EI in 2005 and to CT3 in 2006, underlayed by many photos of the sites and some reports of our experiences.

These lecture notes summarize the most interesting informations, especially refering to what could be helpful for other lunatics to activate remote places for moonbounce DXpeditions.

The contents:

- Choosing a destination for portable EME
- Why Ireland? / why Madeira?
- Suitable equipment for a /p EME-station
- Contructional details of our stressed dish
- Short summary of our experiences
- Review of the results obtained

## Choosing a destination

The criteria for choosing a suitable and interesting location for a mb DXpedition are very simple at first sight: most important is that it should be an DXCC entity, so far never been activated for EME. Second preference is: of course it has to be a location with touristic attractions in order to get the full support of my XYL Monika, as she is my logistics manager and thus responsible for the whole planning procedure (the guy with the soldering iron better keeps to the technics...)
Furthermore to consider:

- Legal operation in terms of frequency range and power limits
- Accessible with reasonable costs (without the NCDXA as a sponsor...)
- Stable mains supply
- Reasonable living conditions on site (not very demanding for somebody, who has lived with Inuits in the Behring Strait during former HF-DXpedition in KL7...)
- Mild WX conditions
- Broad moon window

To be honest, we needed months rather than weeks for completing these considerations...

## Why Ireland, why Madeira??

After due consideration we decided for Ireland in 2005 as a very first test and for Madeira in 2006 as serious approach.
The reasons for EI:

- EI presently on 2m mb only; has been on 70cm years ago (DF6NA); never has been on 23cm so far
- Green Isle is first choice holiday-wise (historical sites, dramatic landscape, good whiskey..)

- Easily accessible from Central Europe by car/ferry
- EI has frequency allocation (70cm, 23cm) on CEPT-basis, ***but:*** power output limited to 160 W on 1296 MHz
- Nice holiday homes to rent in plane countryside, no neighbours = no TVI/BCI

Preferences for Madeira:

- CT3: never been activated on 70 and 23 cm so far
- Madeira has excellent Madeira (wine)
- CT3 has frequency allocation (70cm, 23cm) on CEPT-basis. The max. power output is limited to 1500 W both bands!!
- Reasonnable wheather all year round. If there are winds, they are north-easterly, so the accomodation should be preferably in the south
- There are some cacti on the island (only a few..)

**Suitable equipment for a /p EME-station**

- IC910H with 500Hz filter, modified to give clean 15W RF to drive
- 500 W LDMOS-SSPA by DB6NT, redundant power level
- Commercial G5600 rotator, proved to be weakest point later…
- EA4TX 10 bit interface, driven by F1EHN‘s moontracking softw.

The last two items proved to be weak points in the EI-set-up, so they had to changed for CT3:

- Rotator system replaced by heavy duty design → Alpha Spid
- Tracking software with Spid-driver from D. Anderson, GM4JJJ
- Weight of septum feed reduced by @ 50%


For the Madeira event, we took the challenge of activating the African island not only on 23 cm, but also on 70 cm. This was only possible with a kind loan of B. Korte from BEKO in terms of a HLV700 MOSFet HPA. It still had a weight of 35 kg, but provided a stable 500 W RF output.

A decisive question is the antenna system:

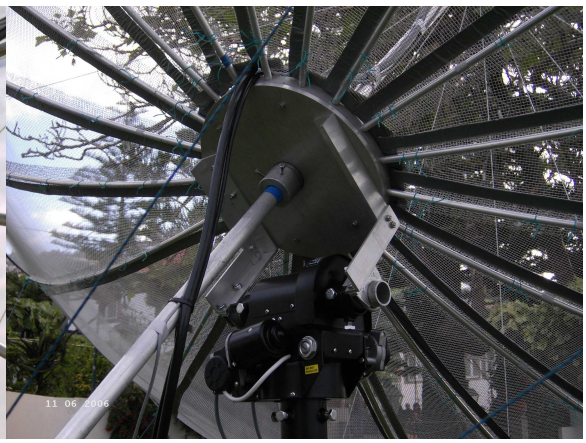
| Property | Parab. Dish | Yagi-Array |
|---|---|---|
| **weight** | **-** | **+/-** |
| **gain** | **+** | **-** |
| **transp. dimensions** | **-** | **+/-** |
| **windload** | **-** | **+** |
| **multiband use** | **+** | **-** |
| ***Summary*** | ***yes, if….*** | ***hmm…*** |

I decided to build a completely new dish, light-weight, which can be knocked down to pieces small enough to be by transported by airplane. The design is a preloaded/stressed dish, similar to a description of K2RIW, who at the time found that this system is only suitable for an f/D > 0.6. We proved a design with an f/D of @ 0.45 is possible, if certain issues are taken into account refering to the stress force dissipation along the struts.

**Constructional Details of the Stressed Dish**

The following gives an abstract of the specific construction, as it might be an encouragement for other operators to build a similar antenna, not only for portable operations. Except screws and bolts, which are stainless steel, all other parts are made from aluminium. The central part of the dish is the hub, which consists of a solid aluminium disk, 350 mm dia and 25 mm thick. The center of the disk has a bore of 32 mm. A bushing jacket is welded to the center disk. This jacket is 70 mm by length, has an outer dia of 50 mm and again an inner bore of 32 mm. The jacket itself has a twofold purpose:

1. the central pole as the feed carrier is stuck through it and fixed by two screws
2. the jacket serves as an axis, which is penetrating a second alu disk, having a central bore of 50.5 mm and a diameter of 350 mm (just the same as the first disk), but only a caliper of 10 mm.

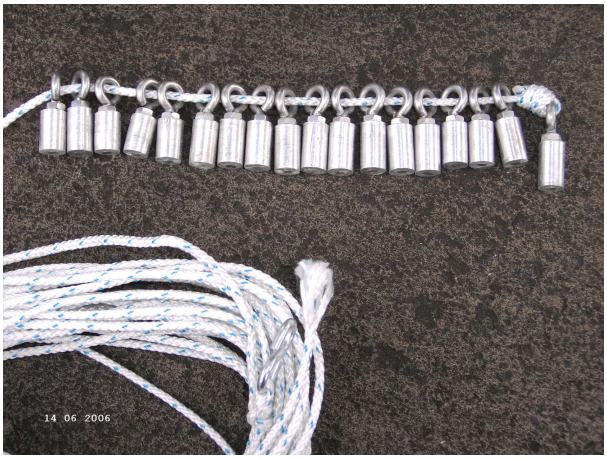
This second disk serves as an adapter to the rotator system, but gives another handling advantage for setting up the dish and installing the upper mesh segments, by enabling to turn around the front hubplate, as long it is not fixed by 4 screws to the adapterplate.

The the thicker hub disk carries 18 radial boreholes in its outer rim, all having a diameter of 12.5 mm and a depth of 120 mm. Theses holes will accept later on the 18 spokes of the dish, which consist of 18 alu tubes 2000 x 12 x 1 mm. Consequently, the angle between between the radial bores has to be 360°: 18 = 20°.

For fixing the 18 front guy wires for stressing the spokes to the central feed pole, a special conical anchor piece was made on a lathe. It has again an inner diameter of 30.5 mm for the protruding pole. The cone's face carries 18 screwed thread eyes for fixing the guy wires. A second identical anchor piece provides the fixing of the rear guy wires to the feedpole.


The front guywires are 1930 mm long, the ones on the rear abt. 2530mm; they have to be made of a very rigid polymer fibre like PET (TM Dacron), as they are not allowed to stretch under stress. The guy wires are fixed to the end of the spokes by means of alu dowels (10mm dia x 15mm), again with thread eyes in their center. The dowels can easily be inserted into the open ends of the 12 mm spoke-tubes. These dowels are stringed onto another Dacron-line, running through all thread eyes as the circumphere of the dish in the stressed state of the struts. This line is giving the preloading of the struts, as they cannot relax into their straight shape, even if the guywires are removed.

The feedpole is an alu tube 1950 x 30 x 3 mm, extended at the feed end by a glassfibre reinforced polyester tube 1000 x 40 x 4 mm. The mesh segments are all identical, made from alu wire mesh 5 x 5 x 0.7 mm. They are pre-cut from a roll in a trapezoidal shape, such that an overlapping of the mounted segments of @ 40 mm is ensured. The mesh panels are tied to the struts by flower binding wire, this is effective, reversible (!) and cheap.




The feed for 23cm originally was an OK1DFC septum, but it proved to be a bit heavy for the dish in practice in EI, so a light-weight copy was made, by using 1 mm alu sheets for CT3.
The 70 cm feed is a modified version of the 1wl loop feed, previously described by CT1DMK. The feed line length was tranfered to ¾ wl, as the relays used for polarization switching were shorted to ground on NO, the reflector has a 5/8wl diam.



**Our experiences in short**

As the EME community knows, in EI we had problems with gale force winds. Our accomodation was brilliant-sited: a lonely house on a cliff, no neighbours. But on the first day, immediately after finishing the installation of the dish (we were off to fill the fridge..), a heavy storm bent over the spokes of the dish, because at that time the spokes were not secured by guy wires on the rear side. Totally disappointed, we cancelled all skeds. Luckily enough, we managed to refurbish the dish (even uglier than b4) and to make several initial contacts to stations all over the world. Because of the continuous winds we dismantled and rebuilt the dish two more times. On one hand, by this we got enough practice with it, but on the other hand the operational time was limited to some 20 hours.

On Madeira Island 2006, the accomodation was close to perfect, an old Quinta with a large garden, despite a big baobab-tree to the East, which prolongated the


trials with Doug, VK3UM. A fully unobstructed take-off to the South, a smashing overlook of the Atlantic at breakfast, an understanding landlord (with his own Madeira winery...) and an impressing number of 'country firsts' made this DXpedition a great success. We managed to moonbounce on two bands, with easily interchangeable feeds for 70 and 23 cm. The feeds could even be changed in the dark within 15 min. Because of the fact we were accompnied by our old friend Peter, DL7YS, who played on HF, and his wife Ulli, we had great fun and excellent meals – Peter is an superb chef de cuisine and coddled us with wonderful food variations.

**Review of the results**

| | EI/DL1YMK | CT3/DL1YMK |
|---|---|---|
| **Number of QSO's 23 cm** | **24** | **52** |
| **Number of QSO's 70 cm** | **-** | **14** |
| **Initials 23 cm** | **23** | **45** |
| **Initials 70 cm** | **-** | **13** |
| **DXCC's 23 cm** | **21** | **31** |
| **DXCC's 70 cm** | **-** | **10** |
| **ODX** | **9444** | **18354 km** |
| **QSO's on random** | **13 / 54%** | **34 / 65%** |

The complete log of CT3/DL1YMK is available at www.ok1dfc.com/Peditions/ct3-dl1ymk/indexct3.html . Zdenek, OK1DFC was kind enough to provide a website for our mb-DXpeditions on his homepage.